

ABSTRACT OF THE DISCLOSURE

A single layer resist lift-off process and apparatus for sub-micron features can include applying concentrated, localized megasonic energy on the surface of a wafer to break sidewall dielectric layers on a lift-off structure to facilitate successful lift-off. Additional steps can include using surfactants in the lift-off fluid to enhance wetting and controlling the chemistry of the lift-off fluid to create conditions which facilitate effective lift-off by creating repulsive Van der Waals forces between the lift-off structures and underlying surfaces. The lift-off fluid can also be formulated to react with the photoresist so that when the sidewall layer is cracked, the reaction between the lift-off fluid and the photoresist can initiate and speed the lift-off process. The lift-off apparatus can include a megasonic head having multiple transducer elements which can be individually operated at different frequencies and power levels to optimize lift-off of differently sized features on the wafer.